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**Single-Cell XIST Expression in Human Preimplantation Embryos and Newly Reprogrammed Female Induced Pluripotent Stem Cells.**

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**Funding Grants:** Correlated time-lapse imaging and single cell molecular analysis of human embryo development

**Public Summary:**

**Scientific Abstract:**

The process of X chromosome inactivation (XCI) during reprogramming to produce human induced pluripotent stem cells (iPSCs), as well as during the extensive programming that occurs in human preimplantation development, is not well-understood. Indeed, studies of XCI during reprogramming to iPSCs report cells with two active X chromosomes and/or cells with one inactive X chromosome. Here, we examine expression of the long noncoding RNA, XIST, in single cells of human embryos through the oocyte-to-embryo transition and in new mRNA reprogrammed iPSCs. We show that XIST is first expressed beginning at the 4-cell stage, coincident with the onset of embryonic genome activation in an asynchronous manner. Additionally, we report that mRNA reprogramming produces iPSCs that initially express XIST transcript; however, expression is rapidly lost with culture. Loss of XIST and H3K27me3 enrichment at the inactive X chromosome at late passage results in X chromosome expression changes. Our data may contribute to applications in disease modeling and potential translational applications of female stem cells.

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